

**ABSTRACT OF THE DISCLOSURE**

The present invention relates to a device for generating an oscillating electrical current, where the device incorporates an ion channel. In particular, the ion channel is incorporated into an integrated electronic device having nanoscale dimensions. Thus, this device can transform biological processes into an electrical output. The present invention also describes a sensor for detecting biological or chemical analytes with the ion channel device. Methods for generating the oscillating currents and detecting the analytes are also disclosed.

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